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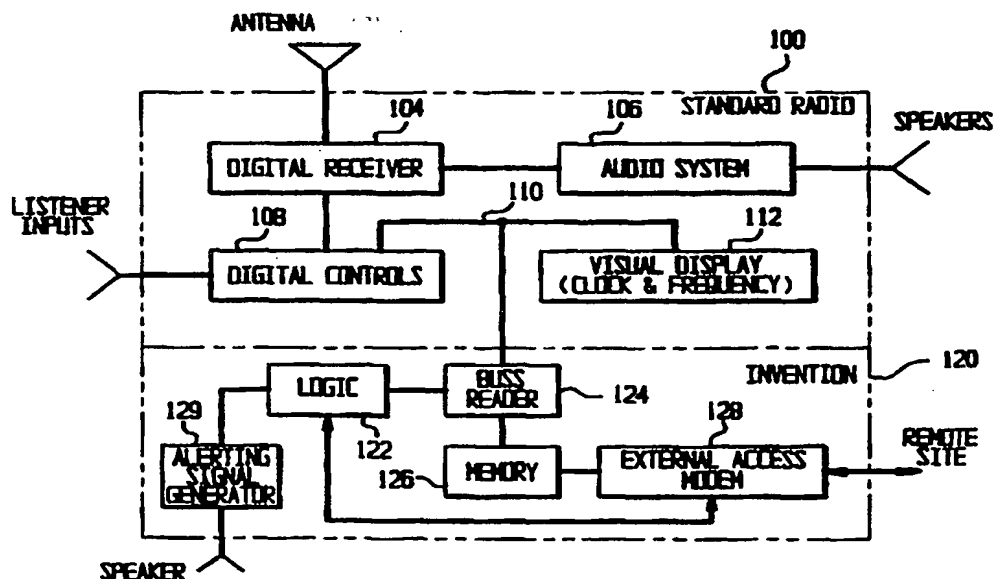
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US98/19032 (22) International Filing Date: 11 September 1998 (11.09.98) (30) Priority Data: 60/058,493 11 September 1997 (11.09.97) US (71) Applicant (for all designated States except US): MOBILE BROADCASTING CORPORATION [US/US]; Building 400, Devon Park Avenue, Wayne, PA 19087 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): SMITH, Doug [US/US]; R.R. 5, Box 121M, Staunton, VA 24401 (US). DiPIANO, Michael, A. [US/US]; Suite 310, 1235 West Lake Drive, Berwyn, PA 19312 (US). (74) Agent: WOODBRIDGE, Richard, C.; Woodbridge & Associates, P.C., P.O. Box 592, Princeton, NJ 08542-0592 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: SYSTEM AND METHOD FOR MONITORING AND RECORDING RADIO LISTENER DATA



## (57) Abstract

This invention relates to a system and method for use in conjunction with a standard automobile radio (100) having a digital display (112), which monitors data related to the station to which the radio is tuned and stores this data for later transmission. The system may be implemented either as an add-on device or as an integral part of the radio. The system will then be able, either by remote control or on a timer basis, to transmit this collected information over the listener's cellular phone.

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/19032

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04B 01/38

US CL : 455/550

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/550, 38.4, 90, 464, 575

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,486,624 A (PUHL et al) 04 December 1984, Fig. 1 and abstract.	1-9 and 13-17
Y	US 5,333,176 A (BURKE et al) 26 July 1994, col. 5, lines 20-34.	1-9 and 13-17
Y	US 5,479,479 A (BRAITBERG et al) 26 December 1995, col. 14, lines 20-43.	1-17
Y	US 5,630,159 A (ZANCHO) 13 May 1997, col. 5, lines 44-60.	1-9 and 13-17
Y	US 5,797,098 A (SCHROEDER et al) 18 August 1998, col. 3, lines 46-63.	1-17



Further documents are listed in the continuation of Box C.



See patent family annex.

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**TITLE: SYSTEM AND METHOD FOR MONITORING AND RECORDING  
RADIO LISTENER DATA**

**INVENTORS: D. SMITH AND M. DiPIANO**

5

**CROSS-REFERENCES TO RELATED APPLICATIONS**

This application claims the benefit of U.S. Provisional Application No. 60/058,493, filed September 11, 1997.

10

**BACKGROUND OF THE INVENTION**

**1. Field of the Invention**

This invention relates to a computer/memory device used in conjunction with a standard automobile radio, which monitors the stations to which the radio is tuned and stores this data for later transmission.

15

**2. Description of the Related Art**

All commercial radio advertising revenue is based upon the number of listeners, the profile of the listeners, the frequency of their listening and the length of time that each listener spends listening to a given radio station. The results of such data determines billions of advertising revenue a year.

20

The existing method of gathering listening profiles is done by "asking" a small sample of people what they have listened to over a specific length or time and then making statistical projections as the general audience. The most common method of "asking" for the listeners' listening history is to have the listener fill out a diary of the specific stations and the amount of time spent listening to each station.

25

As in any keeping of any diary or journal, the accuracy of the inputted

information is only as good as the memory, diligence and honesty of the author. The diary requires that the user recall accurately dozens of listening choices in a given day, often hours after the fact. In addition there is no real incentive for the listener to even try to be accurate even if their memories were flawless. And lastly the listener  
5 may falsely report their listening habits in order not to appear too unsophisticated in light of their actual listening habits.

Various arrangements have been employed to automatically determine the station to which a radio receiver is tuned. One such method for determining station tuning is disclosed in Haselwood et al. U.S. Pat. No. 4,425,578, issued on Jan. 10,  
10 1984. In connection with the method disclosed in that patent, a signal injection source and a detector/receiver are arranged so as to detect the combined signal from the injection signal source and a video carrier to which the video receiver is tuned. A significant drawback of signal injection monitoring arrangements of this type is the potential interference with the functional operation of the video receiver being  
15 monitored.

U.S. Pat. No. 4,723,302, issued on Feb. 2, 1988 to Fulmer et al., discloses another method for determining channel tuning. This method utilizes a local oscillator frequency measurement of the monitored receiver. While this method is generally effective, the disclosed method and apparatus requires that a probe be  
20 positioned at a selected location in the monitored receiver.

Similarly, in Solar, U.S. Pat. No. 4,764,808, issued on Aug. 16, 1988, there is disclosed a method of determining the channel to which a receiver is tuned by detecting a horizontal sweep signal of the monitored receiver. The frequency of the



detected sweep signal is compared to stored characteristic frequency values in order to determine the channel to which the receiver is tuned.

These types of methods for determining the station to which a receiver is tuned are rather complex and expensive in light of the additional electronic elements that need to be employed. The invention described herein overcomes these shortcomings by performing data collection without listener intervention and does so with reduced complexity and a corresponding minimal amount of additional hardware.

10

### **SUMMARY OF THE INVENTION**

Briefly described, the preferred embodiment of the invention comprises a computer/memory device used in conjunction with a standard automobile radio, either as an add on device or as an integral part of the radio, to record the specific stations listened to including such data as what time each station was used. The device will then be able, either by remote control or on a timer basis, to transmit this collected information over the listener's cellular phone. The purpose of this concept is to allow such functions as Arbitron and Neilson listening/viewing statistics to be gathered and to permit specific user profiles as to individual's listening habits.

Almost all radios installed on new automobiles today use digital tuners. This tuning technique requires that a discrete and specific frequency be chosen in order to listen to any radio station. The listener may make the choice or the radio may be commanded to seek a station, but in either case the frequency is displayed digitally and visually on the face of the radio. Further, such digital displays also include time of day information and are capable of displaying information transmitted with the

radio broadcast (i.e., song title, artist, etc.). The preferred embodiment of the present invention reads and stores this information in order to create an exact listening profile automatically and with 100% accuracy.

5

### **BRIEF DESCRIPTION OF THE DRAWINGS**

The present invention can be better understood with reference to the following figures in which like numerals shall represent like elements in the various figures.

FIG. 1 illustrates the preferred embodiment in which the invention is connected to the visual display buss of a standard radio.

10

FIG. 2 illustrates an alternative embodiment of the invention whereby the station information is obtained by an external reader which views the visual display of a standard radio.

### **DETAILED DESCRIPTION OF THE INVENTION**

15

The present invention shall now be described with reference to the accompanying figures.

Fig. 1 depicts the preferred embodiment of the present invention 126 connected to the data buss 110 of the visual display 112. Alternative embodiments permit such an internal connection to any other digital or analog electronic location in a radio that contains an electronic representation of the frequency that the radio is tuned to. By appropriate data base management criteria such as, but not limited to, the time length that a station is tuned to, the specific listening profile of each radio is determined. By way of example, a station may only be considered "listened to" if it is tuned to for at least 5 minutes in a given continuous 15 minute interval. Having

satisfied this timing criteria, the preferred embodiment of the present invention stores in memory 126 the station time information. In the preferred embodiment, this time information comprises the time listening to the station began and the time it terminated -- which times are obtained by the buss reader 124 determining the time of day signal to the visual display 112.

The preferred embodiment of the present invention is thus capable of gathering and storing this data with a minimum of additional electronic hardware. In fact, for those cars already having computer logic hardware capable of being utilized by the present invention, the chief additional hardware requirement is additional memory.

The resultant data base accumulated in memory 126 will later be delivered to interested parties by either an automatic reporting system or on the demand of the interested parties. The delivery mechanism can be any traditional data circuit, such as but not limited to cellular, PCS, private carrier or the internet.

The preferred embodiment transmits this data using the cellular phone system of the car itself. New cars equipped with built-in cell phones are becoming more and more prevalent either as an option or as standard equipment in high-end, luxury automobiles. Further, these automobile cellular systems are not always stand-alone devices but are often integrated into both the sound systems and the non-telephone computer systems in the car. An example of this is the On Star™ system supplied by the General Motors Corporation. In the OnStar™ system the cellular phone is linked to the car stereo in order to provide improved cellular listening. More significantly, the GPS vehicle location system is linked to the cellular system so that independent of the consumer's action or even awareness, a special cellular phone number linkage

provides data from the car to be delivered to a remote computer center.

In a like manner the invention described herein can link 128 to the cellular phone system in the listener's automobile in a manner that allows the stored data to be moved from the invention to a remote computer site. At this remote computer site  
5 this collected data may be analyzed with respect to this particular listener and/or combined with other listeners' profiles to provide national or regional radio listening habits of many thousands of consumers.

The methods of the linkage may vary from requiring significant listener involvement to being entirely automated. The following alternative embodiments  
10 represent examples of these two types of delivery techniques.

In the most rudimentary form, the linkage would require listener involvement. After the invention has accumulated a predetermined amount of information, the invention will produce 129 an audible alert signal that comes on when the radio is next turned on and will last a long enough period of time to cause the listener to desire  
15 to disable the alert by initiating a manual linkage. The manual linkage is started by the listener dialing a special telephone number that connects the cellular phone to a central information gathering computer site. Upon confirmation of the connection the listener places the mouthpiece of the cellular phone adjacent to the radio speakers from whence the audible alert tone is coming. Once the cellular phone is in place the  
20 listener activates the invention to transmit its data by a series of audio tones that pass through the cellular network. Once the data is downloaded, since the listener's radio includes a unique ID number that is downloaded with the data, the central computer system sends a command to the listener's individual radio to turn off the alert tone.

At the other end of the ease of use spectrum, the invention will detect the same

predetermined data accumulation point as above that requires the data to be linked to the central database computer. In this preferred embodiment there is no alerting signal giving to the listener. Rather, the invention will automatically link to the listener's cellular phone, if it is not in use, through the computer data buss that links  
5 all of the listeners' automotive systems. The invention will then dial the central computer database center and in a matter of a few seconds will download its database. Should the listener's cell phone be in use at the time of attaining the predetermined data accumulation point, the system delays this downloading until the phone is free. Further, should downloading be in progress when the listener attempts to make a  
10 cellular call, the downloading operation is aborted and commenced anew once the phone is free. In this manner, the transmission of data does not interfere with the listener's normal use of his cellular phone.

In the automatic mode the listener's tuning or listening profile may also be gathered at the specific request 128 of the central data base computer center. By  
15 dialing each individual cellular phone number of each listener, the central computer can gather as much data from as many listeners as required. In certain fully integrated systems such as OnStar™ the car need not even be running at the time of the data gathering, but the data link may be established at one of the designated "wake-up" times of the car's electronic communications systems.

20 Fig. 2 depicts an alternative embodiment of the present invention wherein the visual display 112 is read by an optical reader 134 whose output is then converted to digital information by a visual reader 130 to thereby gather the display data to be stored. In this embodiment, in order to accommodate existing radios, a device of known art, which is capable of being placed over the digital display screen 112 of the

listener's existing radio which can optically view the station frequency and then  
redisplay them 132 in a manner visible to the listener is incorporated in the above  
invention. An example of such a device is disclosed in U.S. Patent No. 5,305,464  
issued to Kenneth J. Frett on April 19, 1994, which is hereby incorporated by  
5 reference. Such an optical reading device retrieves the listening data as if the  
invention were on the display data buss and the accumulated data is later transmitted  
by the various means described above.

A further alternative embodiment of the present invention relates to  
accumulation of additional data that relates to electronic signals which are embedded  
10 in the radio transmission and used to display, for example, the song title or artist of  
the song being broadcast. Any information that is so transmitted and that is capable  
of being displayed on the radio's visual display can be gathered and stored by the  
present invention.

It is to be understood that the foregoing disclosure taught and described herein  
15 is illustrative of the present invention. Modifications may readily be devised by those  
ordinarily skilled in the art without departing from the spirit or scope of the present  
invention.

## WHAT IS CLAIMED IS:

1. An apparatus 120 for monitoring and recording radio listener data, wherein said radio 110 has a digital display 112 and a data buss 110 whereby display information is supplied to the digital display 112, the system comprising:
  - a. a buss reader means 110 for retrieving the display information; and,
  - b. a memory means 126 for storage of portions of the display information.
2. The apparatus described in claim 1 wherein the radio 110 is an automobile radio.
3. The apparatus described in claim 2 wherein said display information comprises radio station and time of day information.
4. The apparatus described in claim 3 further comprising a transmitting means 128 whereby the stored portions of display information are communicated to a remote location.
5. The apparatus described in claim 4 wherein the transmitting means 128 comprises a cellular phone.
6. The apparatus described in claim 5 further comprising an alerting means 130 whereby the listener is signaled that he is to commence transmitting.
7. The apparatus described in claim 5 wherein the transmitting means further comprises transmitting over the cellular phone without listener intervention.
8. The apparatus described in claim 7 wherein the transmitting means begins transmitting data upon a specific percentage of the memory means 126 being occupied by the stored portions of display information.

9. The apparatus described in claim 7 further comprising a receiving means for receiving a request signal 128 from the remote location whereby the transmitting means 128 begins transmitting data upon receipt of said request signal.
- 5 10. The apparatus described in claim 9 further comprising a computer logic means 122 for processing of data and signal information.
11. The apparatus described in claim 10 wherein the computer logic means is a computer logic circuit contained in the electronic equipment of the automobile.
- 10 12. An apparatus for monitoring and recording radio listener data, wherein said radio 110 has a digital display 112 which displays digital information, the system comprising:
- c. a visual reader 130 for retrieving the display information;
  - 15 d. a memory means 126 for storage of portions of the display information;
- and,
- e. a transmitting means 128 for communicating to a remote location the stored portions of display information.
- 20 13. A method for monitoring and recording radio listener data, wherein said radio 110 has a digital display 112 and a data buss 110 whereby display information is supplied to the digital display 112, the method comprising the steps of:
- a. retrieving the display information; and,
  - b. storing portions of the display information a memory means 126.
- 25 14. The method described in claim 13 further comprising the step of transmitting the stored portions of display information to a remote location.
15. The method described in claim 14 wherein said transmitting step further
- 30 comprises transmitting over a cellular phone without listener intervention.



16. The method described in claim 15 wherein said transmitting step commences upon a specific percentage of the memory means 126 being occupied by the stored portions of display information.

- 5 17. The method described in claim 16 further comprising the step of receiving a request signal 128 from the remote location whereby said transmitting step begins transmitting data upon receipt of said request signal.

